

Polarized RF Gun Meeting, Nov. 7, 2005, FNAL

NC RF Gun for Polarized Beams – Draft 11/5/2005

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R&D Topics

Simulations for bombardment of photocathode by field emitted electrons

Figures→ 1

J.H. Han et al, PRST-AB 8, 033501 (2005)

Y. Luo et al., PAC03, p. 2126

Simulations for bombardment of photocathode by ions

J.W. Lewellen, PRST-AB 5, 020101 (2002)

R.P. Filler III et al, PAC05

Ion bombardment studies to determine effect of specific ion species of various energies on a GaAs activated surface

Figures→ 6

UHV pressure measurement: how to distinguish partial pressures in rf cavity from RGA backgrounds?

H. Tomizawa et al, Appl. Surf. Sci. 235 (2004) 214

Vacuum pumping schemes: Z slots, sieves, NEG pumps, thin film getter coatings, other?

Figures→ 2

R.L. Sheffield, PAC93, p. 2970

D. Yu et al., PAC03, p. 2129

Simulations to estimate vacuum at photocathode

Figures→ 4

R. Roux et al, CARE/ELAN Note-2004-009-ELAN

Choice of rf structure: 1.6-cell, HOM, PWT, other?

Figures→ 3

PWT: D. Yu et al, PAC05

HOM: J.W. Lewellen, Linac2002, p. 671; PRST-AB 4 (2001) 040101

RF input coupler: side (single or dual), axial? Z or theta?

Materials: OFHC Cu, HIP, single-crystal, other?

Figures→ 7

HIP: M. Yoshioka et al., Linac94, p. 302; H. Matsumoto et al., Linac96, p. 626

DC studies: C. Suzuki et al., NIMA 462 (2001) 337; APAC98.

Machining: single-crystal diamond, oil-free, other?

Brazing techniques

RF source issues

Cooling issues

J. Baehr et al., TESLA Note 2003-33.

Photocathode load-lock issues

Cleaning: pure water, clean room (what class?), high-temp bake, other?

See Suzuki in “Materials” above

Cathode plug: choke joint, close fit, other?

Mounting of GaAs crystal: SLAC design for CERN-experiment, other?

Figures→ 5

H. Braun et al., CTF Note 98-13 (1998)

Thermal emittance of GaAs photocathodes

Controlling GaAs vacuum level?

Use a grid on the surface of the crystal???

Simulation of beam dynamics in gun and in transport to injector accelerator

A. Curtoni and M. Jablonka, Tesla2001-22.

Back illumination of GaAs: any advantage? will it work (skin depth issue)?

Photocathodes for RF guns: want more robustness while maintaining high polarization

Laser issues: spatial and temporal pulse shaping, waterbags from pancakes/cigars, other?

B.J. Claessens et al., PRL 95, 164801 (2005); O.J. Luiten et al, PRL 93, 094802 (2004); J. Luiten et al., EPAC04, p. 725.

Other issues or concerns?

Iris shape